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# RE- ENGINEERING SCIENCE EDUCATION FOR EMPLOYMENT AND SELF-PRODUCTIVITY IN NIGERIA

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## **Abstract**

*In recent times science and technology education, taken in this discourse as science education, have not been able to empower students to utilize their knowledge and skills to produce goods and services and create employment. This situation has been attributed to factors such as the use of inappropriate teaching methods, poor funding of science education, lack of laboratory and workshop facilities, unqualified science teachers among others. Traditional education practiced in rural communities have been found to be efficient in empowering individuals to be self productive, inculcate in individuals the ability to create employment which are lacking in the modern day practice of science education in Nigeria. Traditional educational system possesses qualities that are lacking in formal science education. The inability of science education to meet up with its objectives to produce individuals that possess the ability to create employment and produce goods and services calls for its re-engineering.*

Science and technology make life worth-while and worth living. They play important roles in communication, health, agriculture, engineering, transportation, to mention but a few. Indeed science and technology are the pivots of national development and economic growth. The study of science and technology requires that students' should by the end of a science and technology course acquire knowledge and skills that empowers them to assist in solving personal and societal problems. It entails utilizing the knowledge of science and technology to solving the problems of unemployment, diseases, poverty, power and energy, transportation among others. Acquisition and the utilization of knowledge of science and technology bring about creativity and productivity. This implies that a student who successfully acquired the needed knowledge and skills in science and technology should be capable of utilizing them to produce goods, render services and create employment. However, the poor achievement of students' in science and technology related courses over the years in public examinations is an indication that students' do not come out of schools well equipped with the intended knowledge and skills. This partly explains why there is high rate of unemployment, lack of self-productivity and general under-development being experienced in the country today. In order for students' of science and technology to come out of schools well-equipped with knowledge and skills that will empower them

to be self-productive and able to create employment re-engineering the study of science and technology is necessary. Nevertheless, for much of the time science and technology are wrapped together into a single conceptual package known as science (Rose and Hillary, 1969). In this discourse Science and Technology Education (STE) will be considered as simply “science education”.

### **Productivity and Science Education**

The Britanica Concise Encyclopedia describes productivity as a measure of productive efficiency calculated as the ratio of what is produced to what is required to produce it. In other word, productivity describes the output per unit input. Output refers to goods and services produced by an enterprise, while the inputs refer to the factors of production: land, labour and capital. Labour describes all the work that labourers and workers perform at all levels of an organization and it is provided by the human capital. However, there is a connection between science education and productivity. Science education is both a process and outcome. It is a process of acquiring knowledge and skills and utilizing them in new situations. It is therefore expected that an individual that has acquired science education should be able to demonstrate or apply it in new situations to solving problems that confront him and the society. The application of knowledge and skills of science and technology are acts of productivity. Therefore, within the term science education is embedded the concept of productivity as it is through the application of the knowledge and skills that an individual expresses productivity.

In the Nigerian rural communities there are blacksmiths, traditional medicine men, bone setters, cloth weavers, wheel barrow makers and tool fabricators. In these areas there are the applications of the knowledge of science and technology. Even though most of them that are involved in these vocational fields never acquired the knowledge and skills from formal schools, yet they are self-productive, able to create employment for themselves and for others, and have contributed so much to national development. Individuals that have passed the four walls of schools and acquired the knowledge and skills of science and technology are expected to do better than these individuals. They are expected to apply their knowledge and skills in establishing small or medium scale industries that would apply more advanced knowledge and technology to produce goods and services that would add to the standard of living of the citizens. According to commonwealth consortium for Education (2012), science education is aimed at producing citizens who understand their responsibilities and are more able to use science for his benefit and for the benefit of the local societies and communities. For science education to equip the students’ with the competencies to produce and create employment it should be re-engineered.

### **Unemployment in Nigeria and Science Education**

Unemployment refers to the share of the labour force that is without work but available for and seeking employment (ILO, 2012). Unemployment has been a long time social problem confronting Nigeria. By 2009, unemployment rate in Nigeria was

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put at 19.7% (Ibiyemi, 2010) and by 2010 and 2011 it was put at 21.1% and 23.9 respectively (NBS, 2011). Thus, there is a continuous rise in unemployment rate in Nigeria. According to Kale (2011), the total number of unemployed Nigerians rose from more than 12 million in 2010 to more than 14 million in 2011, and majority of those that are unemployed fall within the age of 15 and 44. Individuals of this age range are youths and they constitute the workforce. Youth unemployment leads to social vices such as armed robbery, kidnapping and terrorism.

However, according to Francis (2011), Nigeria has the manpower but has an acute shortage of skilled manpower. Again, the youths are unemployed because they cannot create employment. Science education should empower students' to create employment. Re-engineering science education will reposition it to equip students' with the ability to create employment.

### **Problems of Science Education in Nigeria**

In order to discuss the problems of science education in Nigeria the writer makes an attempt to compare traditional educational system operational in Nigerian rural communities with the modern day science education.

Traditional education has existed in Nigeria over the years. It is a type of education whereby elders and parents transfer skills to the young ones. According to Mkpa (2011), traditional education is a type of education where members of the community who possess specialized skills or abilities in various fields of endeavour transfer them to the growing generation. Traditional education is the basis for local-level decision making in agriculture, healthcare, food preparation, education, natural resource management, and a host of other activities in rural communities (Warren, 1991). It encompasses skills, experiences and insights of peoples applied to maintain or improve their livelihood.

Traditional education is primarily aimed at practical training, such that individuals play useful roles in the society. Young individuals are taught farming, fishing, palm wine tapping, blacksmithing, traditional medicine, mat making among others. In fact, the philosophy behind traditional education is functionalism and productivity (Esu and Junaid, 2011). According to Esu and Junaid, traditional education is devoid of theories, but the primary aim is to inculcate in individuals social and occupational responsibilities to become contributing members of the society. The way science education is carried out today in Nigeria does not encourage practical training; that is students' are not primarily trained to take up occupational responsibilities in the society. Emphasis is placed on certificate acquisition and employment is based as such. School leavers, most especially the university graduates, roam about the streets looking for employment simply because they lack the knowledge and skills to create jobs. The science curriculum of the universities did not lay emphasis on practical training and entrepreneurship skills and students' cannot create jobs when they are out of school.

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Therefore, they cannot engage in production activities and cannot create employment. For science education to emphasize practical training it should be re-engineered.

Traditional education is not carried out in formal schools or in classroom settings and there are no professional teachers. Therefore, no special strategy is employed in imparting the skills on the learners. However, the method of teaching is by observation and doing or learning by doing (Mkpa, 2011). Practical objects were used as instructional materials, skills are learnt in the field of training and theories are less emphasized. Science education demands that learners should learn by observation and doing. Hands-on activities are meant to be major features of science education and practical objects are meant to be used as instructional materials. Similarly, theories are meant to be de-emphasized. Applying hands-on activities by teachers' of science ensures that students' learn to use their hands effectively and imbibe investigative, creative and productive abilities which are ingredients for self- productivity and employment creation. Again, the use of practical objects as instructional materials enhances knowledge and skill acquisition. To ensure that students' that can use their hands are produced in our schools re-engineering should be carried out to include measures that would encourage hands-on activities and the use of practical objects as instructional materials. However, hands-on activities cannot effectively be done where there are lack of equipment in the laboratories and tools in the workshops. Re-engineering also require measures to ensure that the laboratories are equipped with facilities and workshops with tools.

Another important feature of traditional education is that it involves intellectual training and reasoning. Intellectual training enables individuals to fit adequately into a professional group in which he is being trained. The learners are continuously assessed, and practical tests relevant to the learners experience and level of development form the final examination. In most disciplines in science education these qualities are lacking. Theoretical tests form fundamental parts of the final examinations. Continuous assessment which is an educational policy is hardly applied by science teachers. The implication of all these is that students' of science education do not acquire the skills required for self- productivity and employment creation. Above all they do not acquire the intellectual training and reasoning which are basic ingredients of science education. Intelligence and reasoning are important in entrepreneurship activities. In other words, for an individual to perform well in entrepreneurship it is necessary that he should be intelligent and have the ability to reason. Intelligence and reasoning will ensure that viable business opportunities are found.

Traditional education applied the apprenticeship method of learning, whereby individuals learn under their masters who have acquired a particular skill or skills. Science education, especially in the tertiary institutions, is meant to adopt the apprenticeship scheme. Students' of science and technology oriented courses are sent on a compulsory industrial training programme where they are expected to acquire practical skills. However, industrial training is not taken very serious in most cases.

Sometimes students' receive the training in institutions that are not relevant to the supposed skill acquisition. In most cases students' on industrial training are not effectively and adequately monitored or supervised. In the end, student's come out without acquiring the intended skills.

The curriculum of traditional education was not documented, but it was elaborate, comprehensive and embraced all aspects of human development. Hard -work, productivity and self-reliance were emphasized. Individuals remained self-productive and self-employed and even employed others by the end of the training. According to Mkpa (2011), there is little or no case of unemployment. Education was very functional and directed towards the needs of the individuals and of the society. Science education curriculum in Nigeria today emphasizes mainly the cognitive domain rather than the psychomotor domain where the hands of the students' are trained to apply knowledge and skills. Again, hard-work, productivity and self-reliance are not emphasized, instead the acquisition of certificates, by implication, is emphasized. Under these circumstances students' cannot come out of schools with productive skills. It is only when students' have acquired productive skills that they can be self-productive and empowered to create employment.

### **Ways of Re-engineering Science Education in Nigeria**

Re-engineering is defined as the radical redesign of business processes to achieve dramatic improvements in productivity and performance. This involves getting rid of existing processes and procedures and inventing new ones to achieve a leap in performance (Hammer, James and Champy, 1993). Science education can be viewed as an educational enterprise designed to produce individuals with knowledge and skills necessary for survival and solving societal problems. Re-engineering science education, therefore, imply re-inventing or redesigning the procedure, practices and processes involved in science education to improve its performances so that its objectives to produce individuals that can utilize their knowledge and skills to produce goods and services and create employment can be achieved. In line with the discussions so far the writer of this paper recommends as follows:

- Science teachers should be regularly trained and retrained so that they can embrace and acquire the skills of applying teaching methods that encourage hands-on activities. Constructivist teaching methods such as inquiry, discovery, laboratory and concept mapping have been highly recommended for instruction in science education but hardly applied by science teachers in Nigeria. Science teachers should not relent in using constructivist teaching methods since they are the most appropriate for science education. Retraining could be achieved through regular participation in conferences, seminars and workshops. This practice has not been firmly introduced in secondary schools and this is why science teachers in this sector remain with the old knowledge for a long time. With the old knowledge they are not equipped to participate in the implementation of modern day science curriculum.

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- The existing science curricular should be reviewed and updated to include materials that facilitate both knowledge and skill acquisition. They should be re-planned to include more of practical activities and include certain aspects of traditional education such as practical training during learning processes. They should also be planned in such a way that the teaching of science should be directed towards the occupational and vocational needs of the students'. In this way they will imbibe entrepreneurial abilities. This will equip them with the ability to create jobs.
- Efforts should be made by science teachers to include practical tests and workshop practices as part of final examinations. Theoretical questions should be less emphasized during final examinations. This will ensure that students' learn and internalize the intended skills and knowledge.
- Hard-work, productivity and self-reliance should be highly emphasized in the teaching and learning of science in Nigeria as obtained in informal traditional education.
- Proprietors of schools, especially the government, should provide enough funds for the procurement of laboratory and workshop equipment so that regular practical and workshop activities can be carried out in the schools. Regular involvement of students' in practical activities and workshop practices enables them to learn to use their hands and apply their knowledge and skills to produce goods and services, thus engaging in self productivity and employment creation.

## **Conclusion**

Science education is expected to impact on student's the competencies that are crucial for self-productivity and creation of employment. There is then the need to re-engineer science education in Nigeria so that it can be qualitative. It is only through qualitative science education that students' can acquire the competencies for self-productivity and the ability to create employment. The writer is of the opinion that adopting the recommendations that were stated will contribute so much in re-engineering science education in Nigeria for self productivity and employment.

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